

DOCKET NO.: ISIS-4766

PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Ecker, Acevedo, Hebert, Davis, Wyatt and Kiely

Serial No.: **Not Yet Assigned**

Group Art Unit: **Not Yet Assigned**

Filed: **Herewith**

Examiner: **Not Yet Assigned**

For: **CHEMICAL SYNTHESIS APPARATUS EMPLOYING A DROPLET
GENERATOR (AS AMENDED HEREIN)**

Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

This Preliminary Amendment is being filed along with the divisional application filed herewith. Applicants respectfully request that the application be amended as follows.

In the Specification:

Please replace the paragraph beginning at page 1, line 1 of the specification with the following rewritten paragraph containing the amended title of the application:

--Chemical Synthesis Apparatus Employing a Droplet Generator--.

Please insert the following paragraph at page 1 after the title and before the section entitled "Field of the Invention":

--CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a divisional of application Serial No. 09/313,403 filed May 18, 1999, which is a continuation of application Serial No. 08/778,876 filed January 2, 1997, now U.S. Pat. No. 5,925,732, which is a divisional of application Serial No. 08/309,925 filed September 21, 1994.--

Please replace the paragraph beginning at page 8, line 1 of the specification with the following rewritten paragraph:

--Figure 1 is a depiction of a chemical jetting apparatus which may be used with embodiments of the present invention. It will be appreciated that chemical jetting apparatus suitable for use in the present invention may be viewed as being essentially similar to apparatus used in "ink jet" printing. Ink jet printers are known per se and have achieved a separate status in the patent and other literature. For example, class 347 of the patent classification of the United States Patent and Trademark Office contains a large number of patents directed to ink jet technology, to methodologies for employment of ink jets, and to apparatus for use therein. All may be useful in the practice of this invention. While certain modifications of basic ink jets are preferred for use in accordance with the present invention -- chiefly to render the same inert with respect to the chemical reactants employed -- the basic mechanical and materials considerations which attend the provision of ink jet apparatus apply to the manufacture of chemical jetting apparatus as well.--

Please replace the paragraph beginning at page 8, line 18 of the specification with the following rewritten paragraph:

--Referring now to Figure 1, chemical jetting devices are conventionally actuated through piezoelectric devices. A source of chemical reagent, 10 is provided, conventionally through a pumping means, 12 to a chamber, 14 in mechanical communication with a piezoelectric material, 16. The chamber 14, is provided with one or more orifices, 18 through which droplets of reagent, 28 may be expressed through the controlled pumping action of the piezoelectric material. The piezoelectric device is controlled by a piezo driver, 22 which, in turn, is controlled by controller, 32. In some apparatuses, droplets, 28 are provided with an electric charge in a chamber, 24 upon their emergence from the orifice and are accelerated in one or more planes in an acceleration chamber, 26 under the influence of an applied voltage controlled by the charge driver, 20 which, in turn, is controlled by controller, 32. It will be appreciated that the overall effect of the foregoing arrangement is to provide a series of droplets at spaced intervals traveling in predetermined vectors, as showing established by the controller in response to operator programming. It is well known to

direct individual droplets of liquid, 28 to various selected locations on a reaction surface, 40 which, in embodiments of the present invention, is a reaction surface whereupon chemical reactions take place. Droplets, which are not to be directed to particular locations on the surface are, in accordance with this embodiment, directed to a “gutter”, 42 for environmentally approved disposal or recycling.-

Please replace the paragraph beginning at page 22, line 22 of the specification with the following rewritten paragraph:

--Figure 6 shows one example of a preferred arrangement. Reaction support, 40 surmounts collection plate 44 having collection wells 46. The reaction surface, 43 of reaction support, 40 is impinged by reagent droplets, 28 at one predefined reaction site, 42 on the reaction surface, 43 of the reaction support, 40. Internal porosity, 47 is shown although the exact geometry of such pores will rarely be known. Such pores or voids may be those from nuclear bombardment from anisotropic synthesis, or as otherwise known or as described herein. In any event, such pores preferably communicate with the second, distal surface, 45 of the reaction support, 40 preferably without undue lateral wicking, such that liquid impinging a particular site, 42 on the reaction surface, 43 of the reaction support will be transported to the collection well, 46 of collection plate, 44 which is isomorphic with such reaction site. Such liquid is indicated, 49.--

In the Figures:

In Figure 1, please replace reference numeral “26” referring to the “charge driver” with -20--.

In Figure 2, please replace reference numeral “20” with --28-- in both instances.

In Figure 6, please replace reference numeral “20” with --28-- in both instances.

REMARKS

Claims 26-53 are pending in the present application.

The title of the invention has been amended to be consistent with the parent application. In addition, Applicants have added the section entitled "Cross-Reference To Related Applications." Applicants have also amended the paragraph beginning at page 8, line 1 of the specification to correct the classification, as suggested by the Examiner in the parent application.

Applicants have amended the paragraph beginning at page 8, line 18 of the specification to be consistent with the drawings. In particular, the specification has been amended to recite that the piezoelectric device is controlled by a "piezo driver, 22 which, in turn, is controlled by controller, 32," support for which is found in Figure 1. The specification has also been amended to recite that droplets are provided with an electric charge in a chamber, 24 upon their emergence from the orifice and are accelerated in one or more planes in an acceleration chamber, 26 under the influence of an applied voltage controlled by the "charge driver, 20 which, in turn, is controlled by controller, 32." Applicants have also amended the paragraph beginning at page 22, line 22 of the specification to recite droplets, 28. No new matter has been added.

In the parent application, the Examiner objected to Figures 1 and 2 because reference numeral "26" was used for two different elements in Figure 1, and because reference numeral "20" in Figure 2 designated the same element as reference numeral "28" in Figure 1. The Examiner required submission of proposed corrections thereto. Applicants request that Figures 1, 2, and 6 be amended in accordance with MPEP §608.02(w). In Figure 1, reference numeral "26" designating the "charge driver" element has been changed to "20". In both Figure 2 and Figure 6, reference numeral "20" designating droplet elements has been changed to "28". The specification has been amended at page 8, line 25 and page 22, line 25 to reflect the corrections to the Figures. Applicants also submit herewith copies of 2 pages of corrected drawings showing the proposed changes in red ink. No new matter has been added.

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The Examiner is invited to contact Applicants' undersigned representative at (215) 564-8906 if there are any questions regarding Applicants' claimed invention. Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "Version with markings to show changes made."

Respectfully submitted,



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Registration No. 38,534

Date: May 23, 2001

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Application:

Figures 1, 2, and 6 have been amended.

In the Specification:

Paragraph beginning at page 1, line 1 of the specification has been amended as follows:

[Novel Chemical Reaction Apparatus And Methods] Chemical Synthesis Apparatus Employing a Droplet Generator.

A new paragraph has been inserted at page 1 after the title and before the section entitled "Field of the Invention."

Paragraph beginning at page 8, line 1 of the specification has been amended as follows:

Figure 1 is a depiction of a chemical jetting apparatus which may be used with embodiments of the present invention. It will be appreciated that chemical jetting apparatus suitable for use in the present invention may be viewed as being essentially similar to apparatus used in "ink jet" printing. Ink jet printers are known per se and have achieved a separate status in the patent and other literature. For example, class [346] 347 of the patent classification of the United States Patent and Trademark Office contains a large number of patents directed to ink jet technology, to methodologies for employment of ink jets, and to apparatus for use therein. All may be useful in the practice of this invention. While certain modifications of basic ink jets are preferred for use in accordance with the present invention -- chiefly to render the same inert with respect to the chemical reactants employed -- the basic mechanical and materials considerations which attend the provision of ink jet apparatus apply to the manufacture of chemical jetting apparatus as well.

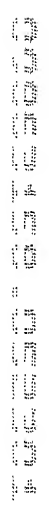
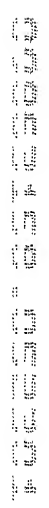
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pumping means, 12 to a chamber, 14 in mechanical communication with a piezoelectric material, 16. The chamber 14, is provided with one or more orifices, 18 through which droplets of reagent, 28 may be expressed through the controlled pumping action of the piezoelectric material. The piezoelectric device is controlled by a piezo driver, [26] 22 which, in turn, is controlled by controller, 32. In some apparatuses, droplets, 28 are provided with an electric charge in a chamber, 24 upon their emergence from the orifice and are accelerated in one or more planes in an acceleration chamber, 26 under the influence of an applied voltage controlled by the charge driver, 20 which, in turn, is controlled by controller, 32. It will be appreciated that the overall effect of the foregoing arrangement is to provide a series of droplets at spaced intervals traveling in predetermined vectors, as showing established by the controller in response to operator programming. It is well known to direct individual droplets of liquid, 28 to various selected locations on a reaction surface, 40 which, in embodiments of the present invention, is a reaction surface whereupon chemical reactions take place. Droplets, which are not to be directed to particular locations on the surface are, in accordance with this embodiment, directed to a "gutter", 42 for environmentally approved disposal or recycling.

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Figure 6 shows one example of a preferred arrangement. Reaction support, 40 surmounts collection plate 44 having collection wells 46. The reaction surface, 43 of reaction support, 40 is impinged by reagent droplets, [20] 28 at one predefined reaction site, 42 on the reaction surface, 43 of the reaction support, 40. Internal porosity, 47 is shown although the exact geometry of such pores will rarely be known. Such pores or voids may be those from nuclear bombardment from anisotropic synthesis, or as otherwise known or as described herein. In any event, such pores preferably communicate with the second, distal surface, 45 of the reaction support, 40 preferably without undue lateral wicking, such that liquid impinging a particular site, 42 on the reaction surface, 43 of the reaction support will be transported to the collection well, 46 of collection plate, 44 which is isomorphic with such reaction site. Such liquid is indicated, 49.

[illegible]

	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta(x-a) dx = f(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta'(x-a) dx = -f'(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta''(x-a) dx = f''(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta^{(n)}(x-a) dx = (-1)^n f^{(n)}(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta(x-a) dx = f(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta'(x-a) dx = -f'(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta''(x-a) dx = f''(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta^{(n)}(x-a) dx = (-1)^n f^{(n)}(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta(x-a) dx = f(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta'(x-a) dx = -f'(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta''(x-a) dx = f''(a)$	$\frac{1}{\sqrt{\pi}} \int_{-\infty}^{\infty} f(x) \delta^{(n)}(x-a) dx = (-1)^n f^{(n)}(a)$
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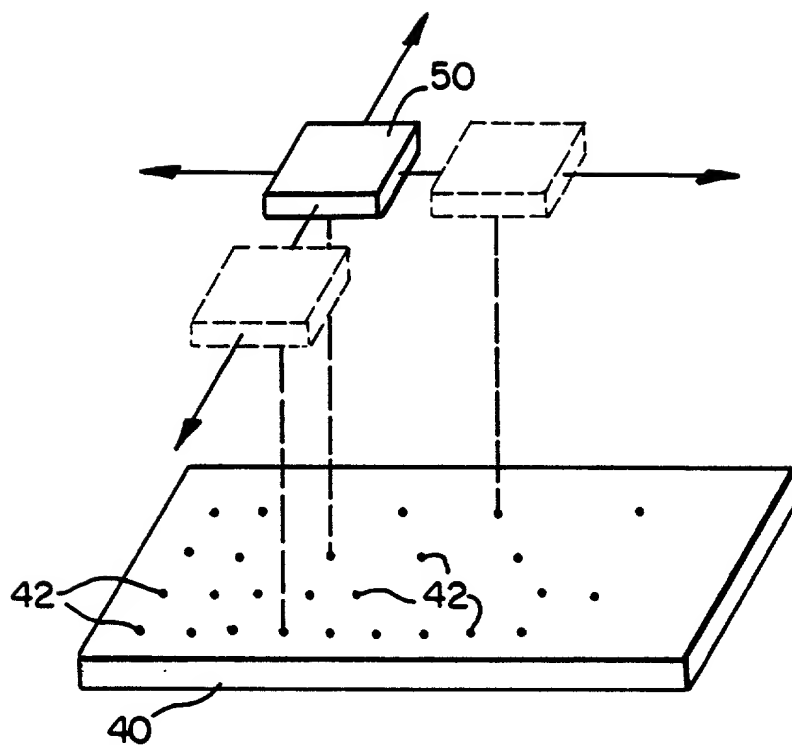


FIG. 5

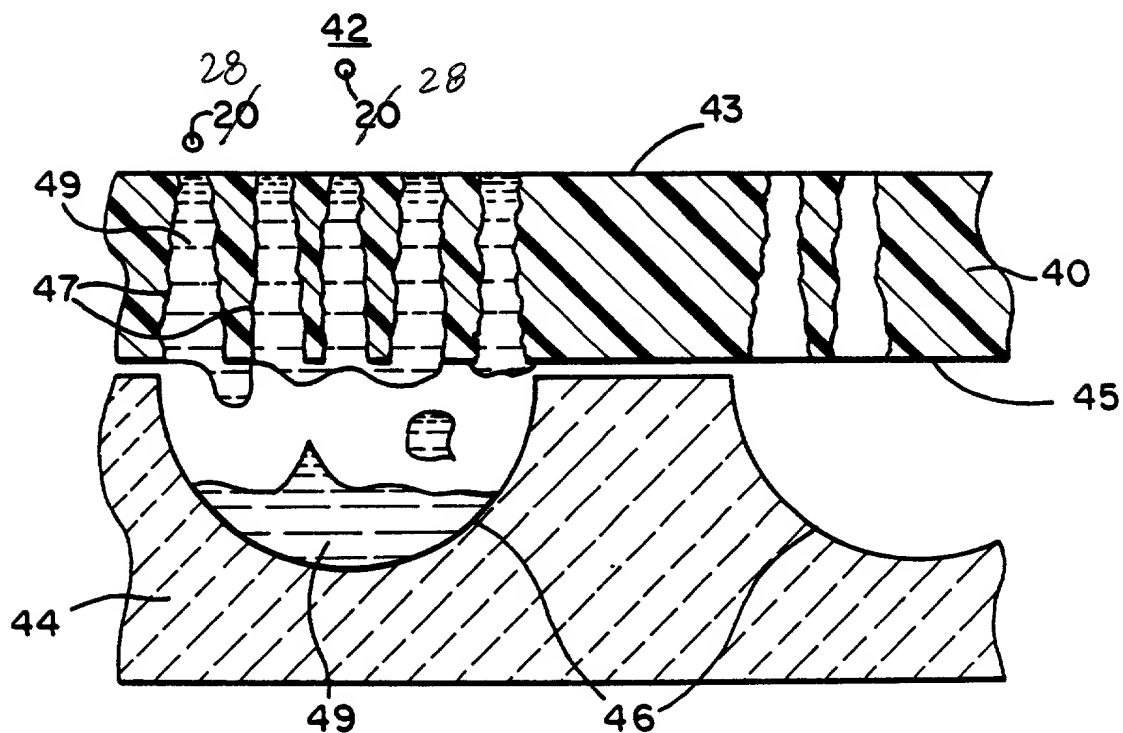


FIG. 6